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University of Rhode Island
Kingston, RI 02881-03118. PERFORMING ORGANIZATION
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19. SECURITY CLASSIFICATION
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13. ✓ A series of Air Force-supported Gordon Conferences were held during 1991 on the following topics/subtopics: Topic-Inorganic Chemistry/Subtopics-Materials and the Solid State; Catalysis; New Chemistry of Polymetallic Complexes; Organometallic Chemistry; New Directions in the Chemistry of Coordination Complexes; Bioinorganic Chemistry; Chemistry of Surfaces; Mechanistic Studies and Ligand Transformations; General Inorganic Chemistry. Topic-High Performance Thermosetting Polymeric Materials/Subtopics-None Specified. Topic-Molten Salts and Liquid Metals/Subtopics-Metal-Molten Salt Solutions; Molten Salts; Dynamic Properties; Electrochemistry; Surface Phenomena; Metal-Nonmetal Transitions; Novel States of Matter; Simulations and Theoretical Interpretations. Topic-Elastomers/Subtopics-Flow, Miscibility, and Diffusion; Toughening Plastics; Synthesis; Networks; Thermoplastic Elastomers; History; Fillers and Vulcanization. Topic-Dynamics of Gas-Surface Interactions/Subtopics-Surface Vibrations; Electronic Transitions; Ultrafast Surface Processes; Dynamics of Adsorption; Surface Diffusion; Liquid Interfaces; Dynamics of Film Growth; Surface Chemical Processes; Special Topics.

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Gordon Research Conference
Inorganic Chemistry
Title of Conference
Brewster Academy, Wolfeboro, NH

Richard D. Adams, Chairman

Suzanne Harris, Vice Chairman

July 29, 1991
Date

Monday, 8:45 am
Materials and the Solid State

Richard D. Adams
Discussion Leader

Robert Haushalter
1. Speaker

Hydrothermal Synthesis of Microporous
Molybdenum Phosphates.
Title of Presentation

Abraham Clearfield
2. Speaker

Synthesizing New Inorganic Structures
from Layered Compounds
Title of Presentation

Jean Rouxel
3. Speaker

Design and Chemical Reactivity in
Low Dimensional Solids
Title of Presentation

Monday 7:30 pm

Catalysis

Richard D. Adams
Discussion Leader

Edward Stiefel
4. Speaker

Transition Metal Sulfur Chemistry
Title of Presentation

David Bryant
5. Speaker

Phosphite Ligands in Hydroformylation
Title of Presentation

July 30, 1991

Date

Tuesday, 9:00 am

**New Chemistry of
Polymetallic Complexes**

Pierre Braunstein
Discussion Leader

Malcolm Chisholm

1. Speaker

Metal-Metal Multiple Bonds in Ordered
Assemblies. Liquid Crystals and Polymers
Title of Presentation

William Evans

2. Speaker

The Utility of Protective Cavities in
Lanthanide Chemistry
Title of Presentation

Yves Jeannin

3. Speaker

The Role of the Heteroatom Lone Pair on
the Structures of Heteropolymetallates.
How to Synthesize Large Polymetalates
Title of Presentation

Tuesday 7:30 pm

Organometallic Chemistry

Pierre Braunstein
Discussion Leader

Gerhard Erker

4. Speaker

Stereochemistry and Catalysis with
Zirconium Complexes
Title of Presentation

Francios Mathey

5. Speaker

The Chemistry of Phosphorus-Carbon
Double Bonds in the Coordination Sphere
of Transition Metals
Title of Presentation

July 31, 1991

Date

Wednesday 9:00 am

**New Directions In the Chemistry
of Coordination Complexes**

George Stanley

Discussion Leader

F. A. Cotton

1. Speaker

Unusal Compounds of Group IV and
Group V Transition Metals.

Title of Presentation

Two Short Talks.

Rinaldo Poli

2. Speaker

New Aspects of Transition Metal
Chemistry in the Intermediate
Oxidation States.

Title of Presentation

Kim Dunbar

3. Speaker

Unusual Chemistry of Mono- and
Binuclear Metal Cations Stabilized
by Weakly Coordinating Ligands

Title of Presentation

Richard A. Walton

4. Speaker

Reactivity and Structural Aspects of
Mononuclear and Dinuclear Polyhydride
Complexes

Title of Presentation

Wednesday 7:30 pm

Bioinorganic Chemistry

George Stanley

Discussion Leader

Gerard Jaouen

5. Speaker

Suicide Cluster Approach in the Study
of Proteins

Title of Presentation

Stephen Lippard

6. Speaker

Recent Progress in Unraveling the
Mechanism of Action of Platinum
Antitumor Drugs

Title of Presentation

August 1, 1991

Date

Thursday, 9:00 am

Chemistry of Surfaces

John P. Fackler

Discussion Leader

Paul Ellis

1. Speaker

Multinuclear Solid-State NMR

Spectroscopy of Systems of Catalytic Interest

Title of Presentation

Jan-Olov Bovin

2. Speaker

Atomic Resolution Microscopy Studies of the Dynamic Structure of Metal Particles and Clusters

Title of Presentation

Hector Abruna

3. Speaker

Scanning Tunneling Microscopy of Redox Active Molecules

Title of Presentation

Thursday 7:30 pm

General Interest

John P. Fackler

Discussion Leader

Edward Stiefel

4. Speaker

The Bioremediation of Prince William Sound

Title of Presentation

Alan Cowley

5. Speaker

The Gordon Research Conferences- History and Future Directions

Title of Presentation

August 2, 1991

Date

Friday, 8:30 am

Mechanistic Studies and Ligand Transformations

Suzanne Harris

Discussion Leader

Istvan Horvath

1. Speaker

Application of High Pressure NMR in Mechanistic Inorganic Chemistry and Catalysis

Title of Presentation

Richard Fish

2. Speaker

Organometallic Models of the HDN Reaction

Title of Presentation

Edward Rosenberg

3. Speaker

Recent Studies of the Chemistry of Metal Cluster Complexes Containing Amine Ligands

Title of Presentation

1991 Gordon Research Conference on Inorganic Chemistry

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1991 GORDON RESEARCH CONFERENCE
"HIGH PERFORMANCE THERMOSETTING POLYMERIC MATERIALS"

July 1-5, 1991

Plymouth State College (N); Plymouth, New Hampshire

Co-Sponsored by:
Air Force Office of Scientific Research
Grant # AFOSR-91-0268

James E. McGrath, Chair
Virginia Polytechnic Institute & State University

* Robert R. Lagasse, Vice-Chair
Sandia National Laboratories

Monday, July 1, 1991

| | |
|-------|---|
| 8:30 | J. E. McGrath Introductory Remarks |
| 9:00 | Discussion Leader, G. L. Wilkes, VPI & SU C. Macosko, U. Minnesota "Modelling Structure Development in Tightly Crosslinked Networks with Applications to Cyanates" |
| 9:45 | Discussion |
| 10:15 | Coffee/Picture |
| 10:30 | Discussion Leader, N. J. Johnston, NASA F. McGarry, MIT "Mechanical Behavior of Rigid Rod Reinforcing with Emphasis on Polymer Fibers: Axial Compressive and Transverse Tensile Strengths" |
| 11:15 | Discussion |
| 11:45 | Poster Previews, (5 min. ea.), R. R. Lagasse, Organizer |
| 12:30 | Lunch |
| 5:00 | Poster Session - 1 |
| 6:00 | Dinner |
| 7:30 | Discussion Leader, C. Feger, IBM D. Dwight, Lehigh Univ. "Fundamental Approaches to the Adhesion of Polymers for Aerospace and Microelectronics" |
| 8:15 | Discussion |
| 8:40 | Break |
| 8:50 | Discussion Leader, P. Hergenrother B. Sillion, C.E.M.O.T.A., France "New Heat Resistant Semi IPN's" |
| 9:35 | Discussion |

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Tuesday, July 2, 1991

| | |
|-------|--|
| 9:00 | <i>Discussion Leader,</i> I. Goldfarb, Wright State E. P. Woo, Dow Chemical "Advances in Benzocyclobutene Based Networks" |
| 9:45 | Discussion |
| 10:15 | Break |
| 10:30 | <i>Discussion Leader,</i> W. Schultz, 3M T. Inoue, Tokyo Inst. Tech. "Structure Development in Thermoset-Thermoplastic Alloys" |
| 11:15 | Discussion |
| 11:45 | Poster Presentations, J. Burnier, Hercules, Chair |
| 12:30 | Lunch |
| 5:00 | Poster Session - 2 |
| 6:00 | Dinner |
| 7:30 | <i>Discussion Leader,</i> H. Bair, AT&T Bell A. Hamilec, McMaster Univ. "Synthesis, Kinetics and Characterization of Polymeric Networks Synthesized by Free-Radical Polymerization" |
| 8:15 | Discussion |
| 8:40 | Break |
| 8:50 | <i>Discussion Leader,</i> J. K. Gillham, Princeton University J. L. Hedrick, IBM "Synthesis and Toughening of Styrenic Networks" |
| 9:35 | Discussion |

Wednesday, July 3, 1991

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|-------|---|
| 9:00 | <i>Discussion Leader,</i> H. Langer, Ashland Chemical Y. Chujo, Kyoto U. "Sol-Gel Inorganic-Organic Hybrid Networks" |
| 9:45 | Discussion |
| 10:15 | Break |
| 10:30 | <i>Discussion Leader,</i> D. Webster, Sherwin Williams J. Hilborn, Beckers, SWEDEN "Vinyl Ether Based Thermosets for Powder Coatings" |
| 11:10 | Discussion |
| 11:30 | <i>Discussion Leader,</i> J. Hay, Kobe Steel S. P. Wilkinson, VPI & SU "Interface Studies on Toughened Bismaleimides and their Carbon Fiber Composites Using Indentation Techniques" |
| 12:10 | Discussion |
| 12:30 | Lunch |
| 5:00 | Poster Session - 3 |
| 6:00 | Dinner |
| 7:30 | <i>Discussion Leader,</i> G. Schornick, BASF NARMCO D. Kranbuehl, William & Mary "Dynamic Dielectric Sensing and Intelligent Cure Control" |
| 8:15 | Discussion |
| 8:40 | Break |
| 8:50 | <i>Discussion Leader,</i> I. Yilgor, Goldschmidt Corp. G. George, UNIV. OF QUEENSLAND, AUSTRALIA "Interfacial Adhesion in UHMPE Composites" |
| 9:35 | Discussion |

Thursday, July 4, 1991

| | |
|-------|---|
| 9:00 | <i>Discussion Leader,</i> D. K. Klapprott, Hysol K. L. Reifsnider, VPI & SU "Micromechanical Foundations for Performance Predictions" |
| 9:40 | Discussion |
| 10:10 | Break |
| 10:20 | <i>Discussion Leader,</i> C. A. Arnold, ICI Fiberite H. Stutz, BASF "Influence of the Structure on Thermoset Cure Kinetics" |
| 11:00 | Discussion |
| 11:30 | <i>Discussion Leader,</i> F. Kelly, University of Akron A. T. Hale, AT&T Bell "Glass Transition Temperature of Thermosetting Polymers" |
| 12:10 | Discussion |
| 12:30 | Lunch |
| 5:00 | <i>Discussion Leader,</i> N. Bikales, National Science Foundation M. McCabe, GE Aircraft Engines "Advanced Material Requirements: Challenges for the Future" |
| 6:00 | Social/Dinner |
| 8:30 | Thermoset "Awards", etc. |

Friday, July 5, 1991

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|-------|---|
| 8:30 | <i>Discussion Leader,</i> R. R. Lagasse S. Eldin, Ciba-Geigy "New Self-Crosslinkable Polyimides" |
| 9:15 | Discussion |
| 9:40 | Break |
| 10:00 | <i>Discussion Leader,</i> R. Bauer, Shell C. K. Ober, CORNELL "Liquid Crystalline Thermosets Based on Triazine and Epoxy Networks" |
| 10:45 | Discussion |

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GORDON RESEARCH CONFERENCE
MOLTEN SALTS AND LIQUID METALS
Tilton School, Tilton, New Hampshire
August 5-9, 1991

Friedrich Hensel, Chairman
John S. Wilkes, Vice-chairman

Monday, August 5

9:00 A.M. METAL-MOLTEN SALT SOLUTIONS

Discussion Leader: Simon C. Moss

M. Tosi, "Stability of Local Structure in Molten Salt and
Salt-Metal Mixtures"

D. L. Price, "Unusual Melting Processes in Metallic and Ionic Compounds"

J. F. Jal, "Ionic Clustering in Metal-Molten Salt Solutions: Its
Connexion with Critical Phenomena and Dynamics"

7:30 P.M. MOLTEN SALTS

Discussion Leader: W. van der Lugt

J. Egan, "Electrons in Molten Salts"

K. G. Weil, "Selfdiffusion, Momentum Transfer, and Charge Transfer
in Highly Ionic Liquids"

Tuesday, August 6

9:00 A.M. DYNAMIC PROPERTIES

Discussion Leader: Lena Torell

K.Funke, "Dynamic Properties of Ionic Alloys and Molten Salts -
Hall Coefficients and High Frequency Conductivities"

G.N.Papatheodorou, "Light Scattering and Structural and Dynamic
Properties of Melts"

Chr.Morkel, "Single Particle Motion in Simple Liquid Metals:
A Neutron Scattering Study"

7:30 P.M. INVITED POSTER PAPERS

Wednesday, August 7

9:00 A.M. ELECTROCHEMISTRY

Discussion Leader: N.J.Bjerrum

S.Kjelstrup-Ratkje, "The Electric Work Method, with Emphasis
on Applications to Thermocells"

G.Mamantov, "Electrochemical and Related Studies of Selected
Refractory Metals in Molten Halides"

C.L.Hussey, "Electrodissolution and Electrodeposition of Metals
in Acidic Room Temperature Chloroaluminate Ionic
Liquids"

7:30 P.M. SURFACE PHENOMENA

Discussion Leader: W.Freyland

J.W.M.Frenken, "Melting and Roughening of Crystal Surfaces"

F.T.Wallenberger, "Melt Spinning of Structural and Optical Fibers
from Low Viscosity Alumina Melts"

Thursday, August 8

9:00 A.M. METAL-NONMETAL TRANSITION

Discussion Leader: H.Endo

D.Logan, "Electrons in Liquid Metals and Alloys: Some Challenges to a Theorist"

R.M.Stratt, "Band Structure in Liquids"

W.W.Warren, "Electron Mass Enhancements in Expanded Alkali Metals"

7:30 P.M. NOVEL STATES OF MATTER

Discussion Leader: J.E.Enderby

N.W.Ashcroft, "Hydrogen: The Simplest (?) Metal"

A.Angell, "Molten Salts at Negative Pressures"

Friday, August 9

9:00 A.M. SIMULATIONS AND THEORETICAL INTERPRETATIONS

Discussion Leader: M.-L.Saboungi

A.Selloni, "First-Principles Simulations of Liquid and Amorphous GaAs"

M.Ross, "Shock Compressed Molten Salts and Metals"

A.Panagiotopoulos, "Gibbs-Ensemble Simulation of Phase Equilibria in Ionic Systems"

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1991 Gordon Conference on Elastomers

July 7 to July 12

Colby-Sawyer College, New London NH

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Vice - Chairperson

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the following organizations for their financial support:

The United States Air Force Office of Scientific Research
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1991 Gordon Conference on Elastomers

July 7 to July 12

Colby-Sawyer College, New London NH

PROGRAM

Breakfast

7.45 am to 8.45 am

Morning Session

8.45 am to 12.00 noon (Except Monday, 9.00 am to 12.00 noon)

Coffee Break about 10.15 am

Lunch

12.30 pm to 1.30pm (Except Friday, 12.00 noon to 1.15pm)

Dinner

6.pm to 7.30pm

Evening Session

7.45 pm to 9.30 pm (Except Thursday, 8.00 pm to 9.30 pm)

1991 Elastomers Gordon Conference

Monday, July 8

Morning Session

Flow, Miscibility and Diffusion

Discussion Leader Jay B. Class

Hercules

A. I. Isayev University of Akron

Nonlinear Viscoelastic
Plastic Flow of Rubber
Compounds

C. Michael Roland Department of the Navy

Polyisoprene - Polybutadiene
Miscible Blends

J. M. Vergnaud University Saint-
and J. Bouzon Etienne

Process of Absorption and
Desorption of Liquids by
Elastomers

Evening Session

Poster Session - Brief Presentations

Toughening Plastics

Discussion Leader Aubert Coran

Monsanto

Raymond Pearson Lehigh University

Toughening Epoxies by the
use of Elastomers

Clive B. Bucknall Cranfield Institute
of Technology

Role of Elastomeric Phase
in Toughening Rigid Polymers

THE UNIVERSITY OF CHICAGO PRESS

[illegible][illegible]olefins using Borane Monomer
and Polymer Approaches

Polymerization

| | |
|--------------|----------------------|
| G. Kaszas | Polysar Rubber Corp. |
| J.P. Kennedy | University of Akron |

Carbocationic Techniques

Diphenylethylene Derivatives to Prepare Hydrocarbon-Soluble Dilithium Initiators and to Synthesize Hetroarm Star- Branched Block Copolymers

[illegible]

Rempp & N. Mougin Sandron

Elastomer Made of Well Defined Polydimethylsiloxane and Polyamide Sequences

Universität Mainz

Statistical Copolymers - A New Concept for Thermo- plastic Elastomers

1991 Elastomers Gordon Conference

Wednesday, July 10

Morning Session

Networks

| | | |
|--------------------|--|---|
| Discussion Leader | Bruce Eichenger | Biosym Technologies |
| ----- | | |
| V. Galiatsatos | University of Akron | Transformation of the End-to-End Vector of a Network Chain in Response to Macroscopic Deformation |
| Moshe Gottlieb | Ben-Gurion University of the Negev | Ultrasonic Methods in the Study of Network-Forming Reactions |
| Gregory B. McKenna | National Institute of Standards and Technology | Mechanical and Swelling Behavior in Rubbers - the Crosslink Dependence of the Chi-Parameter and the Frenkel-Flory-Rehner Hypothesis |

Evening Session

Networks (continued)

| | | |
|-----------------|--|--|
| R. F. T. Stepto | Manchester Materials Science Center | Modelling the Formation and Properties of End-Linked Networks |
| Barry J. Bauer | National Institute of Standards and Technology | Phase Separation in Crosslinked Polymer Networks by Small Angle Neutron Scattering |

1991 Elastomers Gordon Conference

Thursday, July 11

Morning Session

Thermoplastic Elastomers

| | | |
|--------------------|---------------------------------|---|
| Discussion Leader | Dale Meier | Midland Molecular Institute |
| ----- | ----- | ----- |
| Laura Gilliom | Sandia National Laboratories | Solid State Hydrogenation of Elastomers |
| Paula T. Hammond | Massachusetts Institute | Recent Advances in the |
| Haskell W. Beckham | of Technology | Investigation of Diacetylene- |
| Michael F. Rubner | | Functionalized Elastomers |
| S. Fakirov | University of Sofia | Phase and Deformation Behavior of Polyetherester Thermoplastic Elastomers as Revealed by Small Angle X-Ray Scattering |
| Stuart L. Cooper | University of Wisconsin | Morphology and Crystallization Kinetics in Polyether - Poly- Ester Thermoplastic Elastomers |

Evening Session

History

| | | |
|-------------------|---------------------|---------------------------|
| Discussion Leader | Geoffrey Holden | Shell Development Company |
| ----- | ----- | ----- |
| Maurice Morton | University of Akron | The History of Rubber |

1991 Elastomers Gordon Conference

Friday, July 12

Morning Session

Fillers and Vulcanization

| | | |
|----------------------------|---|--|
| Discussion Leader ----- | Binnur Guenesin ----- | Mobil Chemical Company ----- |
| David S. Campbell | The Malaysian Rubber Producers Association | Characterization of Sulfur Cured Networks Using High Field Proton N.M.R. |
| Alan G. Thomas | Queen Mary & Westfield College | Effect of Carbon Black Filler on the Tear Strength of Elastomers |
| Michel Gerspacher | Sid Richardson Carbon and Gasoline Company | Advanced Carbon Black Characterizations and Their Relations with Elastomers Reinforcement |
| Aubert Coran | Monsanto Chemical Company | Kinetics of Carbon Black Dispersion in Rubbers |

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Gordon Research Conference

Proctor Academy, Andover, New Hampshire
August 5-9, 1991

DYNAMICS OF GAS-SURFACE INTERACTIONS

Chairman: Peder J. Estrup

Vice-Chairman: Horia Metiu

MONDAY, AUGUST 5

8:45 AM INTRODUCTORY REMARKS

SURFACE VIBRATIONS

Discussion Leader: Yves Chabal

9:00 AM G.Ewing:

"CO on NaCl: Model System for Studying Surface Dynamics"

9:50 AM P.Guyot-Sionnest:

"Dynamics of Adsorbate-Surface Vibrations, H on Si(111)"

10:40 AM BREAK

11:10 AM P.Toennies:

"Squishy Phonons, Frustrated Translations and Hopping Diffusion"

ELECTRONIC TRANSITIONS

Discussion Leader: Horia Metiu

7:00 PM J.Tully:

"Chemistry at Metal Surfaces: Molecular Dynamics with Electronic Transitions"

7:50 PM C.Harris:

"Spectroscopy of Electrons at Metal Interfaces"

8:40 PM POSTER SESSION I

TUESDAY, AUGUST 6

ULTRAFAST SURFACE PROCESSES

Discussion Leader: Rich Cavanaugh

9:00 AM T.Heinz:

"Femtosecond Dynamics of Desorption: Real Time Investigations"

9:50 AM W.Gadzuk:

"Electron Femtosecond Chemistry at Surfaces"

10:40 AM BREAK

11:10 AM H.Tom:

"Desorption of CO from Cu(111) in < 350 Femtoseconds"

DYNAMICS OF ADSORPTION

Discussion Leader: Mark Cardillo

7:00 PM D.Auerbach:

"The Activated Adsorption of Hydrogen on Copper: 150 years of Confusion"

7:50 PM J.Norskov:

"Theoretical Studies of Molecule-Surface Interactions"

8:40 PM POSTER SESSION II

WEDNESDAY, AUGUST 7

SURFACE DIFFUSION

Discussion Leader: Jimmie Doll

| | | |
|----------|---------------|---|
| 9:00 AM | Y.R. Shen: | "Diffusion of CO on Nickel" |
| 9:50 AM | P. Feibelman: | "Co-valency in Self Diffusion on Metals" |
| 10:40 AM | BREAK | |
| 11:10 AM | D Eigler: | "Atomic and Molecular Manipulation with an STM" |

LIQUID INTERFACES

Discussion Leader: George Comsa

| | | |
|---------|--------------------|--|
| 7:00 PM | M.J. Weaver: | "Structure and Dynamics of Ordered Metal-Solution Interfaces Probed by IR and STM" |
| 7:50 PM | G. Nathanson: | "Inelastic and Reactive Collisions at Gas-Liquid Interfaces" |
| 8:40 PM | POSTER SESSION III | |

THURSDAY, AUGUST 8

DYNAMICS OF FILM GROWTH

Discussion Leader: Robert Gomer

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|----------|---------------|--|
| 9:00 AM | M. Lagally: | "STM Studies of Fundamental Mechanisms in Film Growth" |
| 9:50 AM | B. Poelsma: | "Kinetic Effects in Homoepitaxy" |
| 10:40 AM | BREAK | |
| 11:10 AM | W. Yarbrough: | "Gas/Surface Interaction and the Vapor Phase Synthesis of Diamond - A New Paradigm in Materials Synthesis" |

SPECIAL TOPICS

Discussion Leader: Bruce Kay

| | | |
|---------|--------------------|--|
| 7:00 PM | G. Ertl: | "Non-linear Dynamics in Surface Reactions" |
| 7:50 PM | Discussion Session | |

FRIDAY, AUGUST 9

SURFACE CHEMICAL PROCESSES

Discussion Leader: Sylvia Ceyer

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|----------|--------------|---|
| 9:00 AM | D.A. King: | "Direct Measurements of Adsorption Heat on Single Crystals" |
| 9:50 AM | R. Madix: | "Adsorption and Reactions on Metal Surfaces" |
| 10:40 AM | BREAK | |
| 11:10 AM | P.R. Norton: | "Surface Chemical Aspects of Organometallic Vapor Deposition" |

**GORDON RESEARCH CONFERENCES
PROCTOR ACADEMY**

Dynamics of Gas Surface Interaction

August 4-9, 1991

Chair-P.J. Estrup

Vice-M. Metiu

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